

Theme Article

Hacking the Cis-tem

Transgender Citizens and the Early Digital State

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Abstract—This paper looks at the case of transgender Britons who tried to correct the gender listed on their government-issued ID cards, but ran up against the British government’s increasingly computerized methods for tracking, identifying, and defining citizens. These newly computerizing systems show some of the earliest examples of transphobic algorithmic bias: explicit attempts to program trans people out of the system can be seen in the programming of the early Ministry of Pensions computer system designed to apportion benefits to all tax paying British citizens. Transgender citizens pushed back against these developments, attempting to hack the bureaucratic avenues and categories available to them, laying the groundwork for a coalescing political movement. This paper argues that uncovering the deep prehistory of algorithmic bias and investigating instances of resistance within this history is essential to understanding current debates about algorithmic bias, and how computerized systems have long functioned to create and enforce norms and hierarchies.

■ **ON A MONDAY** morning in the winter of 1958, the U.K.’s *Daily Telegraph and Morning Post* reported that a “fresh week with a new sex and a higher salary starts at the Ministry of Supply, London, today” for Ministry employee Mr. Jonathan Ferguson. “Ferguson, who is 40, made a formal public announcement of change of sex at the week-end,” the newspaper continued, stating that “his birth registration has been amended from ‘female’ to ‘male’ and his new Christian name inserted in the register.”¹

Ferguson had flown supply planes during WWII as a member of the Air Transport Auxiliary and the Women’s Royal Air Force. He was now employed as a technical writer in the field of aircraft research and development in the Civil Service, collecting information and preparing handbooks that instructed pilots on how to fly new types of aircraft (Figure 1). “I do not want any fuss or bother,” said Mr. Ferguson, adding stoically: “I am prepared to face up to this.”²

Ferguson’s comment that he was ready to “face up” to the consequences of his transition gives some sense of the difficulties he faced as a trans man in Britain in the 1950s. Other trans people who made headlines, notably American Christine Jorgensen, whose story of transition

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became the subject of a flurry of publicity in the 1950s, had introduced the wider public to some of the issues facing trans people. By and large, the onus was on trans people to conform to a gender binary in order to prove and solidify their identities publicly, and to transition in ways that comported with what the broader public was assumed to be willing to accept.³

While Jorgenson cut a glamorous figure in newspaper stories, Ferguson seemed to largely shun the spotlight. Yet both shared some similar problems despite public narratives that seemed to indicate completely successful transitions. For instance, Jorgenson later had difficulty marrying her fiancé because her birth certificate continued to list her as “male.”⁴ Ferguson would also run up against issues of government classification in a different way—one that reflected trans Britons’ position as an emerging political class in the computerizing welfare state of mid-20th century Britain.⁵

GENDERED RIGHTS

From the start, the sensationalized press coverage of Ferguson’s transition focused on some surprisingly quotidian elements. “Change of sex puts him in a different employment category, with a rise in salary,” reported one newspaper, underscoring the fact that being reclassified as “male” in the eyes of his employer, the British government, tied into a complex network of gendered economic and labor discrimination.⁶ In fact, not only did his pay change, but his whole job category also changed—even though he was doing exactly the same work, under the same conditions. This was because women workers were not simply paid less but also usually kept in feminized job grades in the Civil Service, despite the government’s claims that the Service was a meritocracy.⁷

A question raised in Parliament by an MP who had heard about Ferguson demanded to know “what form and number of proofs, other than a mere announcement by the subject herself [sic], [is] required before a female [sic] civil servant is permitted to obtain a higher salary, in a different employment category, owing to an alleged change in sex.”⁸ By gaining an official “sex change,” Jonathan Ferguson had suddenly transformed into a “Chief Experimental Officer,” with a male breadwinner salary large enough to support a



Figure 1. Jonathan Ferguson.

family, rather than a woman’s lower wage that was expected only to be supplemental to a family’s earnings. “For obvious pay reasons,” noted the Treasury department, “we should not have wanted to say anything which could have led to a request for the male rate of pay to be applied from [his] date of entry into the Civil Service.”⁹ In other words, the Treasury wanted to ensure that Ferguson did not try to claim back wages.

Conversely, a different civil servant—this time a trans woman—who was working in the Admiralty department and transitioning around the same time was advised it was in her “interest to delay official recognition of the change at least until January, 1960, assuming full equal pay [in the Civil Service] is introduced” by 1961. Her government employers wrote that it was in her “own interest” (in their opinion) to “continue wearing men’s clothes for the time being” in order to avoid a significant reduction in pay.

While these economic elements of transition might seem ancillary to some of the more psychologically, legally, medically, and logistically difficult aspects of transitioning in the mid-1950s, they hint at deeper issues. The massive bureaucracies of the industrialized West now had to face the issue of transgender people transitioning publicly in a way that required state institutions to accommodate them, and it cut to the core of

the heteronormative gendered apparatus on which modern states relied. Earlier in the 20th century, and also in the 19th, laws that enforced and constructed appropriate gender performance in public—usually having to do with dress—had begun to define the concepts of normality and abnormality in gender performance that states would increasingly use to define worthy and normative citizens in the Anglo-American context.¹⁰ Now, however, these decisions about who was an appropriately gendered citizen became even more intertwined with state institutions.

Regarding the trans woman working in the Admiralty, the Treasury remarked that “after consulting,” it became clear “we did not want to lay down any elaborate rule to deal with this rather rare contingency.”¹¹ But in fact, this “contingency” was not that rare. From the 1950s through the 1970s, hundreds of transgender Britons wrote to the government, primarily the Ministry of Pensions and National Insurance, outing themselves in order to draw the benefits they had paid into the programs of the postwar Welfare State.¹² The frequency and similarity of these petitions show a coalescing nascent political group arguing for their rights.¹³

The initial approach of ignoring these cases was uncharacteristic for a massive bureaucracy that prided itself on clear overarching regulations and codified rules for every case.¹⁴ The idea that trans people were few and far between enough to not be formally institutionalized into the government’s operating procedures hid another rationale: at this point in time they were not considered normal citizens, and therefore, in essence, they were not worthy of having clear rules and regulations set out for them or for the management of their records. Even though hundreds of trans people were making themselves known to the government during this period in order to demand their civil rights and the benefits accorded to them as citizens under the new welfare state, the bias against recognizing their identities as valid likewise prevented the government from seeing their complaints as fully real. Yet their economic claims were valid, and these claims combined with concerns about new and growing digital technological infrastructure to prompt a

rethinking at all levels of government about gender, computerization, and the role of the state in determining identity.

TECHNOLOGY AND IDENTITY

By the time John Ferguson died in 1974 at the age of 59, his name had been recorded on a secret government register along with hundreds of other trans people. Behind the public story of Ferguson’s “change of sex” in the eyes of his employer—the U.K. Government—lies another narrative about how that change resonated throughout the state’s welfare systems and the computing technologies that made administering those services possible.¹⁵ The vast technological network that undergirded what the British government provided to all of its citizens—not just its own employees—in return for taxes paid, both literally and figuratively constructed the bodies of British citizens in the latter half of the 20th century.

When transgender citizens and workers asked the state to recognize their gender and to treat and pay them accordingly, their pushback made visible the way that new technologies, far from being neutral, were in fact a battleground in the process of defining and stabilizing “traditional” or normative concepts of gender. The computers that ran the sprawling British welfare state after World War II helped reinstantiate binary gender and all of its attendant inequalities into new institutional and technological realms. In this way, the struggle for trans rights in the mainframe era forms a type of prehistory of algorithmic bias: a clear example of how systems were designed and programmed to accommodate certain people and to deny the existence of others. Even in the early electronic era, the digital realm was increasingly becoming defined as a new battleground in the struggle for trans and queer rights, though this behind-the-scenes activity was not always apparent.¹⁶

SOCIAL WELFARE MEETS COMPUTER LOGIC

After the war, the British government set up a massive welfare state to help the country recover from the devastation of World War II.¹⁷ Not only would the welfare state’s provisions help society rebuild, it would strengthen normative identities taken for granted before the war—further institutionalizing them within a new set of bureaucratic

and technological systems and imbuing them with greater power.¹⁸ The provisions of the welfare state assumed, for instance, that women would be less likely to work outside the home than men, and so established unequal levels of benefit payments for men and women, taking for granted a heteronormative system of binary gender.¹⁹ This, in turn, ensured women were less likely and less able to function without the financial support of a man. Women paid into the system less and received less, even in cases where, for instance, they had sustained identical war injuries as men and required the same care.²⁰

In order to enact these policies, the nation underwent more than just a series of legislative changes: Britain needed to fundamentally alter the technological infrastructure on which its governance relied. Only the speed and capacities of electronic computers made possible the hundreds of millions of computations on millions of citizen accounts required to administer these complex taxation and benefits systems with manageable turnaround times. Although the welfare state was created by policy in an abstract sense, it was created by technology—specifically electronic computing—in a material sense.

Not coincidentally, the largest of the government's computer installations was the massive system that ran the Ministry of Pensions and National Insurance. Not only did the Ministry pay out pensions, war, injury, sickness benefits, and payments to widowed spouses, it also kept track of all the money that working Britons had paid into the welfare system during their working lives. To collect the funds for these benefits, the government administered a highly complex "pay-as-you-earn" (PAYE) system of taxation. Although initially reliant on slower electromechanical computers, the Ministry soon switched to electronics.

The massive recordkeeping requirements of the Ministry of Pensions required them to use several electronic computers in tandem. It also meant they had the largest computing installation (in terms of accounts handled) in the country—and possibly in the world—in the early 1960s. Initially, the Ministry used a LEO II system, but by the early 1960s it employed a larger and more powerful EMIDEC 2400 mainframe (Figure 3). This was the precursor to later lines of mainframes made by the British computer

companies ICT and ICL, which became the standard machines purchased by the British government as a matter of national policy, thereby becoming conjoined with the workings of the state.²¹ The digital labor of the state, its agents, and its computers forms only half of the story of trans Britons seeking their welfare and pension rights, however. The labor of the trans citizens who struggled for recognition forms a kind of implicit digital labor—working, as they were, against strictures that were both bureaucratic and increasingly computerized.

DECIDING WHO "COUNTS"

The EMIDEC 2400 was dedicated to the government's new graduated pension scheme, which ran programming controlling over 32 million citizens' accounts. The first computer of its kind to be put into service, the EMIDEC's importance was reflected in how it was inaugurated with great fanfare, and a visit from the Queen Mother, in July 1962 (Figure 2).²²

The scope of the scale of the installation was immense: the EMIDEC was capable of reading more than 20,000 characters per second from magnetic tape and printed out over 20 million annual statements, reportedly working at the rate of 900 statements per minute (by using multiple printers in parallel). For its first year of operation alone, it required almost 1200 miles of magnetic tape—more than double the length of England—with 200 characters recorded on every inch of the tape.²³ Although it was not scheduled to go into operation until 1962, preparation work for transferring the millions of citizen accounts from punched cards to magnetic tape took up tens of thousands of woman-hours during 1961.²⁴

The purpose of this system was to ensure the accurate and timely collection of taxes and disbursement of state pension payments. As a byproduct, this system—and others like it—took for granted particular identity categories and those designing the system programmed assumptions related to those identity categories into the computer, whose programming (or rules for how to operate on the account data fed into it) was built on pre-electronic rules for handling citizens' accounts. As a result, it was coextensive with the bureaucracy of the Ministry of Pensions and the government's policy decisions.

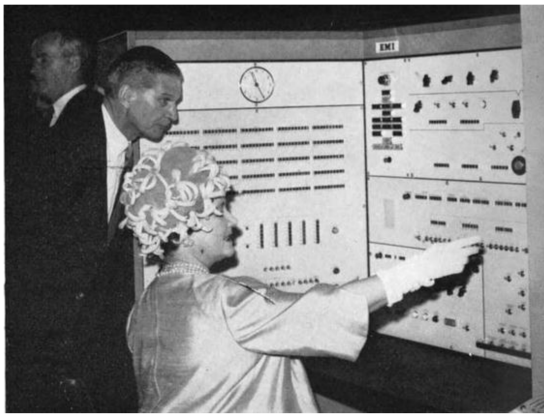


Figure 2. The Queen Mother inaugurates the EMIDEC 2400 at the Newcastle headquarters of the Ministry of Pensions, by pressing a switch that starts a “sort and merge” program. This particular program operated on over 200,000 items and took roughly 50 minutes to complete, according to the Ministry. (Photo from the *Newcastle Chronicle and Journal*, reproduced in the annual *Report of the Ministry of Pensions and National Insurance* for 1961, page 20.)

One of the most critical elements of this system, available to every Briton of working age, was a National Insurance card. Not only did this card ensure eventual pension benefits, it was also, much like social security cards are in the U.S., essentially required in order for a person to be legally employed. Inaccuracies on the National Insurance card could spell disaster not



Figure 3. Photo of the EMIDEC 2400's many tape drives for recording citizens' pension account information, from the *Report of the Ministry of Pensions and National Insurance* for 1961, page 23.

only for a person's eventual pension or disability benefits, but also for their ability to get hired and pay into the system in the first place.

SEEING GENDER LIKE A STATE

All over the U.K. and particularly in London, the seat of government, there was a crackdown underway on homosexuality, prostitution, and other “immoral” acts that had in common their ability to upset traditional gender roles.²⁵ In the 1950s, the U.K. was in the midst of a period of legal and cultural backlash against the social flux fostered by the war. Quentin Crisp, who wrote *The Naked Civil Servant*, remarked that in the blackout all of London had become “a paved double bed.”²⁶ Flamboyantly gay, and what today might also be described as genderqueer, Crisp had spent the war having sex with GIs only to have a rude shock with the coming of peace and its forced emphasis on a return to “normality.” Alan Turing, who had been relatively open about his homosexuality at Bletchley Park, found his candor devastatingly dangerous in the postwar period: His conviction for “gross indecency” in 1952 and subsequent punishment with chemical castration were in part what led to his suicide.²⁷

In this context, there was a growing emphasis on state order and scientific management of citizens' lives. But at the same time, having tasted a greater amount of cultural freedom during the war, people began to push back against the state's efforts to regulate and determine their identities as tightly.²⁸ In the middle of this conservative cultural backlash, as early as 1954, trans Britons began to write to the Ministry of Pensions in order to try to get the gender on their benefits cards corrected.

Although this might seem first and foremost like a political act, its economic dimensions were critical as well because workers had to present their national benefits cards to employers in order to be legally employed, and those cards listed birth name and gender. Many transgender people found themselves in a state of near-unemployability without the ability to get the information on their cards updated. The benefits of the new Welfare State brought with them a heightened emphasis on tracking and control of citizens, especially in their capacity as

workers. In an era when many trans people lived their entire adult lives without disclosing their history to many people, the prospect of making themselves known to an increasingly powerful, expansive, and seemingly Orwellian state required significant courage and trust in the structures of the British government.

Although hundreds of transgender Britons made the choice to identify themselves to the government and try to work within the structures of its bureaucracy, hundreds or likely even thousands more resisted or rejected doing so. The trans people recorded in the records of the Ministry of Pensions are just the “tip of the iceberg” in terms of numbers of transgender and genderqueer British citizens living in the mid-20th century.²⁹ Even among the group of citizens petitioning for legal gender changes, one civil servant noted that “quite a number of these people do change sex more than once,” intimating the genderfluidity and genderqueerness that may have lain behind even “standard” attempts to get formal governmental recognition of a legal change of gender.³⁰

The process of requesting a change usually began when a transgender person wrote to the Ministry of Pensions to request it. At this point, the Ministry began a file on that person. The Ministry also created centralized lists to keep track of every trans citizen who wrote to them—these long handwritten lists recorded hundreds of people by the 1960s.³¹ Although the files could not be viewed by civil servants below the executive officer level due to the “sensitive” information they contained, the lists did not remain within the Ministry of Pensions.³² Executive officers there shared it with the government’s chief medical officers, both to seek advice and also to share information with the government’s medical establishment which was eager to use the lists for research purposes. Although citizens wrote to the Ministry likely expecting discretion, they became part of the government’s informal and relatively crude longitudinal medical studies on the nature of trans identity and the process of transitioning. The government’s medical experts, however sympathetic to trans people’s “predicaments” at this time, nonetheless positioned transgender bodies as abnormal, and trans people’s psychological states as damaged or aberrant.³³

Attached to each person’s name on these lists was a corresponding reference number that gave more details on the specifics of that individual’s case. Whether the Ministry granted or refused someone’s request for gender emendation on an insurance card was based on characteristics and concerns that were class based or often arbitrary. For instance, gainful employment was used to establish the legitimacy of the person’s claim, and white-collar professionals were regarded more highly than other workers. Race also undoubtedly played a significant factor.

Officially, the way a person received permission to change the gender on their record required recruiting witnesses, usually including a doctor, to swear to the legitimacy of their gender. The General Registrar’s Office “pointed out, however, that there were cases where doctors were unwilling to commit themselves and that there were differences of medical opinions on the whole matter.”³⁴ In this way, changing the records held by the state was bound up within not only medicalizing discourses, but also ideals about class, sexual and gender normativity, and economic worthiness. Indeed, a certain level of resources was required even to successfully mount these claims.

Paradoxically, for the government to recognize a “sex change,” Ministers came up with a work-around that involved denying the possibility of actually “changing sex.” There was no such thing as a change of sex in the government’s official view, only errors in the recording of sex at birth. In essence, any successful application needed to comport with the fiction that the gender recorded on a person’s birth certificate had accidentally diverged from what the government actually viewed as that person’s immutable physical sexual characteristics. But in fact, this tactic was simply a way of working within the existing system.

To get an amended birth certificate, two witnesses had to attest that there was an “error” in the original recording of sex on the birth certificate. The Ministry admitted, however, that this line of reasoning became exceedingly difficult to maintain in their view when used for cases like the MTF Admiralty employee mentioned earlier: she had two biological children with her wife prior to transitioning. In her file, officials note that her biological children are going to make it

much harder to convince the General Registrar's Office that there was an "error of recording at birth" that simply needed to be fixed. Nonetheless, that was the approach they took. This way of amending birth certificates so that benefits cards could be changed was an elaborate fiction; a workaround to stay within existing state structures and social norms that aimed to cover up the very fact that people could in fact be transgender. All of these machinations were in essence deployed to try to make gender seem immutable and neatly binary, even though these citizens' requests showed just the opposite.³⁵

One high level civil servant noted that "it would be in accordance with the official views of other authorities if we adopt a lenient and sympathetic attitude to the issue of [changing] contribution cards" in the Ministry of Pensions.³⁶ On one level, these workarounds were an attempt to accommodate to a group of citizens who were as yet poorly understood. But, on another level, they showed how poorly the structures of the state accounted for and understood gender. They often inaccurately described trans people's existence and identities in painstaking detail, in order to uphold the strictures—and the fiction—of binary unchanging gender.

This understanding of gender put in place by the state—necessarily binary, and a key social marker—determined the shape of many state institutions, from gendered civil service exams to different pension amounts for men and women. From the 1950s through the 1970s, as the cases of trans complainants swelled in number, the government continued to adhere to their preferred fictions of how to establish gender, even while beginning to see the problematic nature of such modes of categorization in fact.

BINARY COMPUTABLE GENDER

Throughout the fifties and sixties, the Ministry's procedure for dealing with trans citizens' requests focused on allowing, and in fact somewhat encouraging, changes of gender on a person's birth certificate for ease of recording gender in the Pensions system. The Ministry also established rules that dictated that the citizen's preferred name and title would be used in correspondence.³⁷

But these procedures started to change as the computer systems used by the Ministry expanded to take over more and more of the account handling. Changing the gender recorded on one's birth certificate and insurance card was only the first step. In order for the economic elements of the change to take effect, it also had to be literally "taken into account"—and ultimately programmed into the Ministry's computer system.³⁸

The computer systems used by the Ministry played their own critical role in constructing whose identities were normative and whose were not. Certain accounts were designated as "exception cases." Paradoxically, the expansion of the computers' use, with all the flexibility their programming could have allowed, instead reified binary gender and strengthened the fiction of gender as an unchanged and unchanging category. Despite the enhanced flexibility offered by computerized methods, the digitization of people's accounts actually resulted in *less* flexibility and *less* accommodating policies for trans people.

Although the Ministry had used electromechanical and electronic computers for years, the main EMIDEC computer system meant to take over all operations of the department was not fully stable and online well into the sixties. Computers were used for certain calculations and accounts, while other procedures were still carried out manually or semi-manually. This was due in part to changes in how national insurance benefits were to be calculated and paid in the coming years. In the mid sixties, the computers were being upgraded to implement the more complex graduated pensions system which changed how taxation on earnings was calculated. Now, it would be based specifically on people's individual earnings rather than on broader categories like gender and age.

While the two mainframe computers, a LEO II and the EMIDEC 2400, were "working to capacity," on implementing this new taxation protocol, most pensioners continued to be paid using ledger books.³⁹ The labor involved in updating the system to be fully computerized was primarily the labor of data input: punching of new cards that would allow citizens' accounts to become fully digital. But ensuring that this information was punched accurately for all of the millions of accounts was a herculean task. Even if they

treated it with the urgency of a “wartime operation,” the Ministry reasoned it would still take a year. The information was entered into the computer by punching pools made up exclusively of women.⁴⁰

Transferring this information over to punch cards accurately would determine the workings of the computer system for years to come. This shows how the system was, crucially, constructed not simply by its hardware and programming, but by its data stores as well. In many ways, the data were the critical component to the systems’ functioning. How information was categorized, sorted, and taxonomized before, during, and after being transferred to punched cards was itself a critical part of the system.

Against this background, the way trans people’s account data was recorded became an important part of the new computerized system. Instead of regularizing the procedures for trans citizens in a way that incorporated their accounts seamlessly into the new system’s data structures and programming, the Ministry took advantage of this technological change to reverse course. No longer would trans citizens’ requests for gender changes be honored: Instead, they would be told that the new system did not “see” gender, and that, therefore, there was now no reason for the Ministry to assent to changing gender on their accounts. Behind the scenes, however, trans citizens’ files were programmed into the computer in a way that explicitly positioned them as aberrant due to the fact that the gender on their account records did not match their lived gender identities.

A handwritten memo from the mid-1970s explained the reasoning behind this new hard line approach, noting that “it has been decided that National Insurance cards must bear the original name and title of the insured person” because “to issue a man with a card bearing a woman’s name might encourage him to believe that the department accepts his ‘change of sex’ and thus believe himself to be entitled to benefits as a woman under national insurance.” Furthermore, “the person might use the card as a form of identity card as a help to masquerading in the opposite sex with ‘official recognition.’” The memo goes on to say that because it is no longer necessary to show the National Insurance card to employers—one can

simply give one’s national insurance *number* to one’s employer—the Ministry should no longer see it as necessity to change trans people’s cards to comport with their identity: “Without exercising the strict medical controls which were necessary when National Insurance cards had to be presented to employers, the Department is not willing to show any change of sex on an official document.”⁴¹

The logic is both speciously consistent and entirely tautological: The idea that trans people’s cards should not be changed is justified by saying that the change is no longer important—given the fact the cards do not have to be presented to employers. Yet the change is simultaneously denied on the grounds that this form of official recognition would be so important and powerful that trans people could use it as leverage to attain more rights, accommodations, and recognition. Although the Ministry would continue to address a trans person “by any name he or she wishes” on correspondence, the Ministry now took the line that it would be “contrary to public policy to issue cards in the opposite sex without far reaching and expansive controls,” adding again, “we see no reason for this since the card itself need not be shown.”⁴² In essence, the Ministry had decided to use the power of the new computer system to resubmerge trans citizens and their requests for recognition.

A form letter sent to trans Britons who queried the Ministry about changing the gender on their records in the mid-1970s seems to be the first incidence of the Ministry referring to “change of gender” instead of “sex change.”⁴³ This evolution of language, however, was not indicative of forward progress. In it, the bureaucrat tasked with responding writes that although the gender on people’s cards had been changed in the past, this is no longer done because the Ministry no longer considers it necessary. Previously, revised cards “were issued on medical advice to make it easier for the applicants to find employment in their chosen roles,” but “under the Social Security Act 1973 which came into effect on 6 April 1975, all contributions for employed people are earnings related and collected with PAYE tax. The rates for men and women, with certain exceptions, are the same. National Insurance cards no longer need to be presented to employers, who merely need to

know the national insurance number and the name of the employee.”⁴⁴ It was now the government’s position that there was no longer a logistical or economic need to correct one’s gender on a National Insurance card.

Yet the attempts of the Ministry to present an image of a seamlessly working new system in which gender was now unimportant were further contradicted by the specific workings of their computing procedures behind the scenes. “The computer account of each known transsexual bears an indicator to ensure all queries are directed to a special section within RD2B,” one document notes. What this meant in lay terms was that each trans citizen who had made themselves known to the government had an account that had been coded to trigger an exception case which immediately kicked it out of the normal computer processing chain.

The way that trans citizens had been coded into the new system was actually designed to trigger “compatibility check failures.”⁴⁵ Form RD25 under section RD2B would then be used to initiate a manual or semi-manual process of resolving the compatibility check failure. This “failure” mode had been deliberately programmed into the system, specifically as a means of ensuring trans people would not be allowed to exist within the new system except by virtue of special exceptions made on a case-by-case basis. The computerized process was designed to undercut the validity of that person’s gender identity *as a matter of procedure*.

The fact that this was unnecessary—the system could have been programmed to make these trans citizens a regular class of users instead of making them into exception cases—is indicated elsewhere in the same document discussed above. The departmental officer notes that while they might need to “seek advice” from higher levels on particular cases, they had in fact codified instructions in a separate memorandum about how to proceed with “run of the mill” cases of trans people’s pension contributions and claims.⁴⁶ That the instructions contained in this memorandum were not made part of the system’s programming, instead requiring even those “run of the mill” cases to be kicked out for manual oversight and review, shows that the

programming of the new computerized system was intentionally designed not to lessen the friction between trans citizens and the state, but to in fact increase it, raising the likelihood that benefits would either be denied, delayed, or made harder to access.

PREHISTORIES OF ALGORITHMIC BIAS

This episode is an early example of algorithmic bias in action: the programming and data handling of the Ministry’s computer were specifically engineered to ensure trans people were not a regular, accepted class of users, but only institutionalized as a group of “exception” cases that had to be dealt with as being aberrant from the norm. Although the changeover to an almost-fully-digitized system offered benefits of flexibility and customizability, as well as greater speed, the system was not used to ensure that people were able to more easily live in their gender. Instead, it was used as a tool for explaining and justifying a rollback of previous procedures that had given trans Britons the opportunity to change their documentation and change their gender in the eyes of the state. The addition of the computerized system actually made it less likely that the state would truly see them as they were.

The instantiation of anti-trans policy via computer in this particular case is important because it demonstrates three important points. First, the provisioning of social security, health, and welfare benefits in the 20th century makes them an important site for discussion about how citizens’ bodies and identities are not only policed but also formed. Whether people remain sick or recover, how bodies function and flourish, are hungry or fed, and whether they live or die at any given moment hinges on the ability to gain access to the care promised by the state in return for paying taxes as part of participating in a democratic civil society that guarantees citizens a safety net.

Second, the British welfare state was itself so heavily modeled on a gender binary that negotiating its strictures as a trans or nonbinary person brought the sexism, heterosexism, and gender discrimination inherent in the system and its workings into high relief.

Third, there were large enough numbers of trans Britons asserting their rights to the benefits of the new welfare state to be taken for granted as a class of citizen-users, had the state chosen to see them as such. Indeed, these files may contain some of the earliest examples of how trans citizens began to emerge as a specific cohesive class arguing for their rights in British society in the 20th century. The appearance of digital systems designed to discipline identity is not coincidental, but rather formative in this context.

This is also an instance that shows how the structures and forms of technologies alter the way that institutions deal with civil rights claims. In the pre-electronic system, Ministry officers would change the gender recorded on National Insurance cards because that was seen as the best workaround to accommodate trans citizens at the time, given the constraints and affordances of that system. Once the Ministry was able to load everything into the computer system, what should have been a more flexible and individualized PAYE system made it possible in practice for the government to renege on the accommodations they had previously put in place, using the logic that the constraints of the new system no longer required those prior accommodations.

The limitations of the system that entailed this were not hard and fast but designed in by Ministry officials in accordance with their worldview. In their view, simply hiding what they called “true sex” (the gender recorded on someone’s birth certificate) was an acceptable workaround, and in fact the method that they preferred. When the computerized system made this possibility easier, according to the government’s logic, changing gender on official documents was no longer deemed necessary or possible.

The computer system was explicitly designed to reinstate and strengthen not only the idea of static, permanent, immutable gender, but also to continue to uphold strictly binary gender. While some trans people had the ability to fit within the State’s fiction of a gender binary, genderqueer and gender nonconforming trans people remained illegible within, and unsettling to, the systems in place both before and after the changes in this period. The state’s investment in binary gender as a key status marker and category of social, political, and economic

organization meant that nonbinary, genderqueer, and genderfluid citizens remained unable to fully claim their rights. Some hint of the struggle in making genderqueerness or nonbinary gender legible in this context may be inferred from the records indicating some citizens reported multiple “changes of sex” to the government over the course of several years.⁴⁷

THE POWER OF COMPUTING

Cultural and political ideals undergirded the Ministry’s views of what was possible, and necessary, in the switchover to a fully electronic system. The Ministry designed the new system to comport not only with trans people’s needs, but also with their own ideas—and to some extent the ideas of the government writ large—about immutable gender, scientific management, and efficiency. The notion—sometimes specious, sometimes genuine, and sometimes outright false—that accommodating trans citizens resulted in a reduction in efficiency in the structures of the state points to the way in which scientific management—the idea that workers can be boiled down to their constituent actions for the sake of industrial efficiency—increasingly came to define not just what citizens did in the context of the workplace but also how they were allowed to exist in their nonlaboring hours.⁴⁸

The problems of gender essentialism and gender binarism in technological systems continue to exist today, and are repeatedly built into ever more complex computing systems. Computing researchers and trans studies scholars are increasingly pointing out the inherent problems with, for instance, artificial intelligence systems that are designed to “discern” or algorithmically “identify” gender from facial data or other categories, and they are offering alternative models that affirm, rather than exclude, a wider variety of genders.⁴⁹

Yet, computing in the service of powerful interests, be they state or corporate, tends to inculcate stereotypes and static identities appropriate to reifying and perpetuating forms of existing power. The purpose of these systems is to discipline information in the service of a particular goal. In order to increase their own efficiency and power, such systems must stylize reality and

translate it into an informational landscape where it can be acted upon in a seemingly frictionless, disinterested, and unbiased way. In point of fact, however, this process of rendering information computable relies on institutionalizing the views and biases of those constructing the system, and reflexively serves their ends.⁵⁰

Through investigating histories like this, we can begin to see how the construction and manipulation of key identity categories by large computerized systems is not a new concern, but rather a process that has been underway for decades. Historical examples like this one can help further contextualize recent developments and make clearer the stakes involved.

At first glance, the state actors in this history seem to be taking on the logic of a machine to address a problem they did not understand well. We see a similar phenomenon in discussions of algorithmic bias today: the idea that ultimately no one is responsible for computerized mistakes. But, in fact, government officials were leveraging the constraints of a system they helped build to argue against the civil rights claims of a large number of Britons. The earliest examples of computerized bias allow us to unpack the fictions of unbiased efficiency and endless flexibility that we have been sold throughout the electronic age.

The particulars of this history can also help us better understand why diversity in our current technosocial networks is still often ignored, attacked, reduced to stereotypes, or positioned as somehow outside the responsibility of technology products and the corporations that produce them—even as these technologies and their creators clearly accommodate and encourage certain groups while marginalizing and submerging others. Assertions of algorithmic blamelessness often go hand in hand with the idea that the complexity of modern systems has made it all but impossible to assign responsibility for, or control over, their many programmed-in inequalities. In truth, however, these instances are simply up-to-date examples of structural, institutionalized biases in action.⁵¹

Although this history addresses a government system, it resonates with a host of technological platforms today which, by virtue of their power, ubiquity, and insistence on defining the terms and

standards of their systems in a top-down way, have become incredibly powerful and even pseudogovernmental. Historically, the process of computerization has not come without strife or without specific top-down decisions about the “proper” shape of civil societies and the status of particular groups within those societies. By investigating groups of people who resisted the top-down effects of centralized computer infrastructures in the main-frame era, history can help guide discussions about how to resist the large, powerful, and often obfuscated computing systems of our own era which shape our lives as workers and citizens.

■ ENDNOTES/REFERENCES

1. “Higher salary as a man,” *Daily Telegraph Morning Post*, clipping in T 215/550: Sex changes by civil servants: Proof required for revised conditions of service, U.K. Nat. Arch., London, U.K., Jan. 13, 1958.
2. T 215/550: Sex changes by civil servants: Proof required for revised conditions of service, U.K. Nat. Arch., London, U.K.
3. It is important to note that these publicity discourses performed a particular kind of identity-creation, rather than necessarily reflecting the reality of all trans people’s lives. As Matt Houlbrook has cautioned, historians of LGBTQ people and communities must contend with queerness and “move beyond simplistic exercises in historical recovery” when discussing and attempting to periodize 20th century LGBTQ history. See, for instance, M. Houlbrook, “Thinking queer: The social and the sexual in interwar Britain,” in *British Queer History: New Approaches and Perspectives*, Brian Lewis, Ed. Manchester, U.K: Manchester Univ. Press, 2013; and *Queer London: Perils and Pleasures in the Sexual Metropolis, 1918-1957*. Chicago, IL, USA: Chicago Univ. Press, 2005.
4. For context on Christine Jorgenson’s story, see, J. Meyerowitz, *How Sex Changed: A History of Transsexuality in the United States*. Cambridge, MA, USA: Harvard Univ. Press, 2004.
5. In the U.S. context, significant work has been done on the issue of governmentality and attempts to “fix,” or render permanent, trans identities. In their article, “‘We will not know who you are’: Contesting sex designations in New York City birth certificates,” Paisley Currah and Lisa Jean Moore point out how the language and processes of the state render—or attempt to render—certain trans identities either

- fraudulent, permanent, and/or authentic, and how these overlap with scientific ideals of gender and bureaucratic directives concerning the importance of stable, unchanging categories and systems of classification. *Hypatia*, vol. 24, no. 3, pp. 113–135, Summer 2009.
6. "Higher salary as a man," *Daily Telegraph Morning Post*, clipping in T 215/550: Sex changes by civil servants: Proof required for revised conditions of service, U.K. Nat. Arch, London, U.K., Jan. 13, 1958.
 7. For a fuller discussion of wage inequalities and the ramifications of gendered labor stratification in the British Civil Service, see, M. Hicks, *Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing*. Cambridge, MA, USA: MIT Press, 2017; and H. Glew, *Gender, Rhetoric and Regulation: Women's Work in the Civil Service and the London County Council, 1900-55*. Manchester, U.K.: Manchester Univ. Press, 2016.
 8. *Hansard*, Jan. 29, 1958, col. W. A. 83.
 9. "Captain Kerby's Question," Letter to J. J. S. Shaw from S. D. Light, T 215/550: Sex changes by civil servants: Proof required for revised conditions of service, U.K. Nat. Arch., London, U.K., Feb. 7, 1958.
 10. In *Arresting Dress: Cross Dressing, Law, and Fascination in Nineteenth-Century San Francisco* (Duke University Press, 2015), Clare Sears looks at how the concepts of transvestite, transsexual, and transgender were both policed and produced by a spate of late 19th and early 20th century laws (in the United States) focused on defining gender normality in the public sphere.
 11. "Note for Record: Admiralty Staff – Change of Sex," Treasury Memo, T 215/550: Sex changes by civil servants: Proof required for revised conditions of service, U.K. Nat. Arch., London, U.K., Jan. 5, 1958.
 12. PIN 43/591: Ministry of National Insurance: Change of sex cases—statistics, U.K. Nat. Arch. London, U.K.
 13. Susan Stryker's *Transgender History: The Roots of Today's Revolution*, (Seal Press, 2008) notes how much of the historical literature on trans experience tends to "individualize, rather than collectivize," and calls for more accounts of transness that "imagine [trans people] as part of communities and social movements" (2).
 14. See, for example, J. Agar, *The Government Machine*. Cambridge, MA, USA: MIT Press, 2003; R. Lowe, *The Official History of the British Civil Service: Reforming the Civil Service, Volume I: The Fulton Years, 1966-81*. New York, NY, USA: Routledge, 2011.
 15. Laura Doan discusses how even the ideal of "modern heterosexuality," perceived as immutable in retrospect, was nonetheless in flux as recently as the early 20th century—see, "Sex education and the great war soldier: A queer analysis of the practice of "hetero" sex," *J. Brit. Stud.*, vol. 51, no. 3, pp. 641–663, Jul. 2012. Similarly, particular kinds of solidification of binary gender categories through bureaucratic and technological norms were connected to 20th century developments in technocratic governance.
 16. The files on which this research is based had limited circulation within the government. In addition to their contents being kept relatively secret at the time, they were also kept secret for half a century or more afterward when they were in the care of the U.K. National Archives. Most were only opened in response to repeated FOIA requests from the author. The opened files were redacted to protect the identities of the government agents involved in some of these cases, though the names of the trans people discussed in the files were not redacted. I have made it a point not to mention by name any trans people listed in the files who did not appear in newspapers at the time, so as not to out anyone who has not already publicly discussed their trans identity.
 17. Great Britain, and W. H. Beveridge, "Social insurance and allied services," Report, HMSO, London, U.K., 1942.
 18. Donna J. Drucker has shown how computing devices, through pushing quantitative techniques into qualitative fields like sexology, in fact helped construct categories of sexuality that we still largely take for granted today, such as the gradations of homosexuality on the famous "Kinsey Scale." See, "Keying desire: Alfred Kinsey's use of punched-card machines for sex research," *J. History Sexuality*, vol. 22, no. 1, pp. 105–125, Jan. 2013.
 19. Much of this is made explicit in the pages of the Beveridge Report, which refers to how wives and women will be treated by the new welfare state as though the two categories are all but interchangeable. For a fuller discussion, see: S. Pedersen, *Family, Dependence, and the Origins of the Welfare State: Britain and France, 1914-1945*. Cambridge, U.K.: Cambridge Univ. Press, 1993.
 20. M. Hicks, *Programmed Inequality*. Cambridge, MA, USA: MIT Press, 2017, p. 44. See also, I. Zweiniger-Bargielowska, *Women in Twentieth-Century Britain*. New York, NY, USA: Routledge, 2001.

21. For more background on the technical lineage of these computers see: M. Campbell-Kelly, *ICL: A Business and Technical History*. Oxford, U.K.: Clarendon Press, 1989.
22. U.K. Ministry Pensions Nat. Insurance, "Report of the Ministry of Pensions and National Insurance for 1961 (Cmnd. 1764)," Her Majesty's Stationery Office, London, U.K., 1962.
23. M. Hicks, *Programmed Inequality*. Cambridge, MA, USA: MIT Press, 2017, pp. 105–110.
24. U.K. Ministry Pensions Nat. Insurance, "Report of the Ministry of Pensions and National Insurance for 1961 (Cmnd. 1764)," Her Majesty's Stationery Office, London, U.K., 1962.
25. Furthermore, as Amy Tooth Murphy points out, an increase in visibility of LGBTQ people in public spaces belied much of the forced conformity that continued within domestic spaces in postwar Britain. See "'I conformed; I got married. It seemed like a good idea at the time': Domesticity in Postwar Lesbian Oral History," in *British Queer History*, B. Lewis, Ed. Manchester, U.K.: Manchester Univ. Press, 2013.
26. Quentin Crisp, *The Naked Civil Servant*. London, U.K.: Penguin, 1968, p. 149.
27. Court documents: <http://www.turing.org.uk/sources/sentence.html>
28. James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT, USA: Yale Univ. Press, 1998.
29. For more on this, see, B. Lewis, Ed., *British Queer History: New Approaches and Perspectives*. Manchester, U.K.: Manchester Univ. Press, 2013; C. Tebbutt, "The spectre of the 'Man-Woman Athlete': Mark Weston, Zdenek Koubek, the 1936 Olympics and the uncertainty of Sex," *Women's History Rev.*, vol. 24, no. 5, pp. 721–738, 2015; K. Hindmarch-Watson, "Lois Schwich, the female errand boy: Narratives of female cross-dressing in Late-Victorian London," *GLQ, J. Lesbian Gay Stud.*, vol. 14, no. 1, pp. 69–98, 2007; L. Doan, *Disturbing Practices: History, Sexuality, and Women's Experience of Modern War*. Chicago, IL, USA: Univ. Chicago Press, 2013; and Q. Crisp, *The Naked Civil Servant*. London, U.K.: Jonathan Cape, 1968.
30. PIN 43/592: Ministry of National Insurance: Change of sex cases—statistics—Graduated national insurance contributions, Covering Memo from M. Nelson, U.K. Nat. Arch., Jun. 4, 1963. As Jen Manion underscores in a history of Charles Hamilton, an 18th century doctor, "people who crossed gender—or who crossed back and forth—were never simply one gender or another," and yet the most common historical, linguistic, and bureaucratic categories we use to describe actors in the past make it difficult to make people's genders legible in this way, particularly after centuries of legal and state efforts to criminalize such identities and ways of being in the world. See, J. Manion, "The queer history of passing as a man in early Pennsylvania," *Pennsylvania Legacies*, vol. 16, no. 1, pp. 6–11, Spring 2016.
31. PIN 43/591: Ministry of National Insurance: Change of sex cases—statistics, U.K. Nat. Arch., London, U.K. Note: When these files were opened under FOIA requests, certain elements were redacted, but the names of trans people on the lists mentioned were not. As a matter of research ethics, I have not referred to anyone by name who was not also publicly visible in newspapers at the time (such as Jonathan Ferguson).
32. PIN 43/592: Ministry of National Insurance: Change of sex cases—statistics—Graduated national insurance contributions, U.K. Nat. Arch., London, U.K.
33. T 215/550: Sex changes by civil servants: Proof required for revised conditions of service.
34. PIN 43/591: Ministry of National Insurance: Change of sex cases—statistics, U.K. Nat. Arch., London, U.K.
35. T 215/550: Sex changes by civil servants: Proof required for revised conditions of service, U.K. Nat. Arch., London, U.K.
36. PIN 43/591: Ministry of National Insurance: Change of sex cases—statistics, U.K. Nat. Arch., London, U.K.
37. T 215/550: Sex changes by civil servants: proof required for revised conditions of service; PIN 43/591: Ministry of National Insurance: Change of sex cases—statistics; and PIN 43/592: Ministry of National Insurance: Change of sex cases—statistics—Graduated National Insurance Contributions. (All from U.K. National Archives, London, U.K.)
38. PIN 53/22: Pension uprating 1965—Use of computers to expedite payments, U.K. Nat. Arch., London, U.K.
39. PIN 53/22: Pension uprating 1965—Use of computers to expedite payments, U.K. Nat. Arch., London, U.K.
40. These high-stress punching jobs, often performed under poor conditions, were exclusively done by women. Later during this era, punchers flexed their might by engaging in work stoppages and strikes, bringing down key computer installations and showing the uselessness of programming and hardware without data. See, M. Hicks, *Programmed Inequality*.

- Cambridge, MA, USA: MIT Press, 2017, pp. 68–69, 203–205, 209–210.
41. PIN 43/595: Ministry of National Insurance and successors: Insurance Department C: Registered Files (CB, CQD and AB Series). Change of sex cases: Earnings related contributions; disclosure of information; change of sex on birth certificate. Handwritten memo from Jean Somerville, Jun. 30, 1975.
 42. PIN 43/595: Ministry of National Insurance and successors: Insurance Department C: Registered Files (CB, CQD and AB Series). Change of sex cases: Earnings related contributions; disclosure of information; change of sex on birth certificate. Handwritten memo from Jean Somerville, Jun. 30, 1975.
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 44. PIN 43/595: Ministry of National Insurance and successors: Insurance Department C: Registered Files (CB, CQD and AB Series). Change of sex cases: Earnings related contributions; disclosure of information; change of sex on birth certificate. Form letter from the Department of Health and Social Security, signed by C. Wilson, Jul. 1976.
 45. PIN 43/594: Ministry of National Insurance and successors: Insurance Department C: Registered Files (CB, CQD and AB Series). Change of sex cases: Earnings related contributions; disclosure of information. Memo from F. Cunningham, Jan. 11, 1980.
 46. PIN 43/594: Ministry of National Insurance and successors: Insurance Department C: Registered Files (CB, CQD and AB Series). Change of sex cases: Earnings related contributions; disclosure of information. Memorandum from E. J. Pearson to Mr. Armstrong, "Refund of costs paid after age 60 in age/sex disclosure cases," Feb. 29, 1980.
 47. PIN 43/592: Ministry of National Insurance: Change of sex cases—statistics—Graduated National Insurance Contributions. Covering Memo from M. Nelson, U.K. Nat. Arch., London, U.K., Jun. 4, 1963.
 48. Frederick Winslow Taylor, known as the "Father of scientific management," wrote *The Principles of Scientific Management* in 1911—a book that has been described by *The Economist* as "the first business best seller." (see: <https://www.economist.com/node/13051591>). Taylor's ideas were lauded by top industrialists like Henry Ford as a boon to productivity and control, but have been sharply criticized for the way his time-motion studies, and the recommendations derived from them, deprive human workers of agency and autonomy, seemingly aiming to make them into near automatons.
 49. See, for instance, O. Keyes, "The misgendering machines: Trans/HCI implications of automatic gender recognition," in *Proc. ACM Human-Comput. Interact.*, Nov. 2018, vol. 2, Paper 88; J. A. Johnson, "Information systems and the translation of transgender," *Transgender Stud. Quart.*, vol. 2, no. 1, pp. 160–165, 2015; J. Harrison-Quintana, J. M. Grant, and I. G. Rivera, "Boxes of our own creation: A trans data collection Wo/Manifesto," *Transgender Stud. Quart.*, vol. 2, no. 1, pp. 166–174, 2015; C. Labuski and C. Keo-Meier, "The (Mis)measure of trans," *Transgender Stud. Quart.*, vol. 2, no. 1, pp. 13–33, 2015.
 50. It is important to note that this appeal to efficiency is also often an appeal to the *idea* of efficiency rather than efficiency itself, and also can be used to mask bias. In many cases efficiency is lowered, rather than raised, even by the metrics of those seeking to enhance the efficient operation of the system in question. In current news, the ban of transgender troops from the U.S. military gives one good example of this false appeal to "efficiency."
 51. See, for example, S. Noble, *Algorithms of Oppression*. New York, NY, USA: New York Univ. Press, 2018.

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